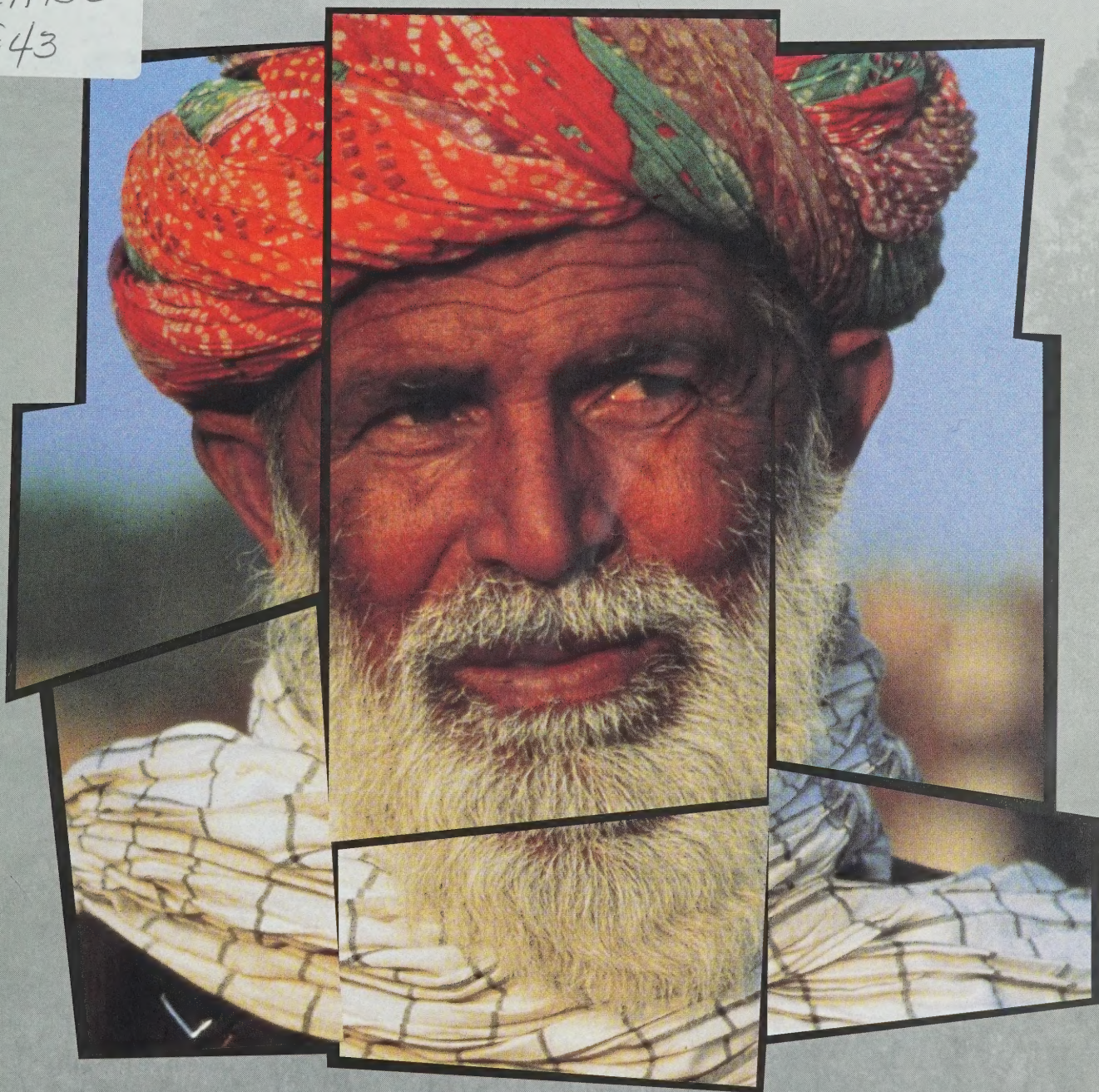


GLOBAL

I M P A C T S

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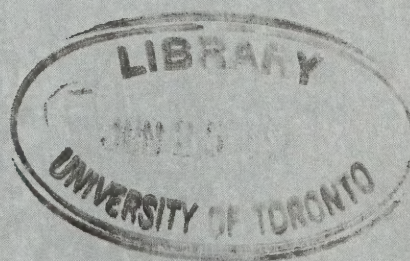
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GLOBAL RESEARCH PRIORITIES 1997-1999

CONNECTING
PEOPLE AND IDEAS
WORLDWIDE

The International Development Research Centre is a public corporation created by the Parliament of Canada to help researchers and communities in the developing world find solutions to their social, economic, and environmental problems. IDRC connects people, institutions, and ideas to ensure that the results of research it supports and the knowledge that research generates are shared equitably among its partners, North and South.

IDRC'S MANDATE

To initiate, encourage, support, and conduct research into the problems of the developing regions of the world." – from the 1970 IDRC Act

IDRC'S MISSION

Empowerment through knowledge

IDRC'S APPROACH

*Knowledge is the key
Sustainable improvements in human well-being depend on knowledge, its production, distribution, ownership, and wise application.*

RESEARCH IS THE MEANS

Research done in and by a country is vitally important for the production of knowledge needed for its development.

PEOPLE ARE THE VEHICLE

Development takes place when men, women, and their communities develop the ability to identify and solve their own problems.

SUSTAINABLE AND EQUITABLE DEVELOPMENT IS THE GOAL

IDRC is pledged to the generation and use of knowledge in ways that alleviate poverty and improve people's lives.

OLD PROBLEMS, NEW APPROACHES

Poverty is a deeply rooted problem in both developing and developed countries. IDRC's experience has shown that the components of complex issues like global poverty cannot be usefully separated; social, environmental, and economic factors remain inextricably linked. By themselves, traditional disciplines, like economics, are inadequate in confronting many of the challenges developing countries face. To deal with the tangled nature of development issues, IDRC has pioneered new approaches for delivering its program of research support. Rather than starting with one discipline and seeking to solve a problem, IDRC will start with the problem and consider what knowledge and which disciplines can contribute to its solution. This multidisciplinary focus continues IDRC's search for effective and more holistic solutions to development challenges.

DAVID BARBOUR



Setting Priorities

To define the issues that are priority, IDRC has chosen six development themes. They are:

Food Security

By the year 2025, over 1.1 billion people will lack the basic food requirements needed to lead healthy, productive lives. Rapid population growth will fuel this trend by driving more and more poor men and women into cities and onto fragile ecosystems. To stem the tide of “food-insecure” people, IDRC will support research into:

- sustainable management of fragile ecosystems such as highland and mountain areas, arid and semi-arid regions, and rain forests;
- linking commodity chains, from production to marketing and consumption, to ensure that developing countries profit fully from the sustainable use of their food resources; and
- urban and periurban agriculture, a major source of food and earnings for urban dwellers.

Equity in Natural Resources Use

Sustainable and equitable development allows for the sharing of the world’s resources among those alive today and between present and future generations. History has shown that resource use is often a source of conflict. As populations grow, competition for resources is likely to increase. To encourage sustainable and equitable development and reduce the potential for hostility, IDRC will support research into:

- resource management policies in regions or countries where recent political strife has disrupted the process of governing;
- decision-making processes that integrate environmental, social, and economic objectives; and
- managing the demands for water and productive soil in the Middle East and Africa, a source of present and, possibly, future conflict.

Biodiversity Conservation

Biodiversity refers to the variety and variability among living organisms. It is the source for much of the food, medicines, and industrial products that humans use, and it is disappearing at an unprecedented rate. IDRC will support research that concentrates on:

- indigenous knowledge of biodiversity and the institutions needed to protect and use this knowledge;
- market-based incentives for the sustainable use of the products of biodiversity, especially medicinal plants and nontimber forest products;
- the sustainable use of biodiversity to conserve plants and animals;
- the involvement of communities in the development and conservation of agricultural and aquatic biodiversity; and
- models for intellectual property and traditional resource rights to ensure equitable sharing of the benefits of biodiversity.

Sustainable Employment

Developing countries face a daunting challenge in providing employment for their young, growing populations. Their national economies and the global marketplace in which they trade are changing rapidly. New job-creation programs must protect the environment and workers rights and must include disadvantaged groups. To help the developing world tackle its employment challenge, IDRC will support research that focuses on:

- the policy environment for job growth and options open to developing-country governments in trade policy, macroeconomic management, and labour-market policies;
- opportunities and challenges facing small and medium-sized enterprises, particularly strategies to promote innovation and improve environmental management; and
- the repercussions of technological change on employment, with particular attention to information and communication technologies and biotechnology.



RICHARD LORD



Strategies and Policies for Healthy Societies

Despite remarkable improvements in human development, the basic needs of millions of men, women, and children for health, education, social integration, and security are not met. Strategies for preventing disease and policies for providing affordable and effective social programs are still urgently needed. To help build “healthy societies” that meet peoples’ basic needs, IDRC will support research on:

- the development and testing of measures to prevent disease at the household level;
- the process of public policymaking for societies in which the roles of the state, the private sector, and nongovernmental organizations are changing; and
- social reconstruction that builds on the successes and learns from the failures in countries emerging from civil war or social upheaval.

Information and Communication

Although the worldwide use of information and communication technologies has grown rapidly, there is still a large divide between the information “haves” of the North and the information “have nots,” especially in the South. Nevertheless, information and communication technologies have a tremendous potential to make “knowledge connections” within and among developing countries and their partners. To reduce the information gap, IDRC will support research on:

- applications of information and communication technologies in problem solving, decision-making, and knowledge access and transfer;
- networking and the use of information and communication technologies to meet the needs of local communities and to promote equity in development; and
- policies and practices that will increase the benefits and reduce the negative impacts of the evolving information infrastructure on developing countries and their people.

Delivering the Goods

The mechanisms that IDRC has developed to deliver a clearly focused program of support to research include:

Program Initiatives – Program initiatives are the Centre’s primary programing unit for funding research in developing countries. Managed by a multidisciplinary team from within the Centre, they are working networks that link Southern and Northern researchers to address specific research problems and set a research agenda. By linking all the parties involved in the research process, IDRC hopes to add to the likelihood of success. Because of their multidisciplinary focus, program initiatives will often address issues that fall under several of IDRC’s development themes.

Explorations – Explorations identify potential opportunities for IDRC intervention. They allow IDRC to test the feasibility of making a significant contribution to research for development before committing the resources needed to address a particular research problem effectively.

International Secretariats – Critical avenues of research sometimes require more effort and resources than IDRC can provide. In such cases, IDRC often acts as a catalyst for the funds and resources needed to create an international secretariat. Secretariats facilitate donor support by providing the necessary financial and administrative infrastructure needed to undertake a long-term research agenda. Independent steering committees ensure that the appropriate research priorities are followed.

DENIS SING



Program Complements

Canadian Collaboration

IDRC builds strategic alliances with Canada's scientific, academic, and development communities. By linking its national partners with its networks of Southern collaborators, IDRC also increases the opportunities for Canadians to contribute to, and benefit from, international research.

Corporate Communications

IDRC's corporate communications program shares the results of Centre-supported research among its key target audiences: government, media, research and donor communities, the corporate sector, and the Canadian public. IDRC Books, a scholarly press, publishes and distributes development research results to Canadians and an international audience.

Evaluation

IDRC uses evaluation to learn "what works" in development research. The evaluation process is linked to decision-making, policy formulation and program management within the Centre and its partner institutions. IDRC's evaluation program has developed and applied innovative methods for assessing institutional performance and for measuring the effects of development interventions. It has also contracted out its expertise on a consulting basis.

Gender and Sustainable Development

All research funded by IDRC must account for the differential impact that change will have on the lives of men and women. To ensure that IDRC projects promote sustainable and equitable development, the gender and sustainable development program supports gender mainstreaming and analysis in the Centre's work.

Program Support

IDRC's reputation as a leader in research for development and its history of solid administrative support has made the Centre home to more than 10 international secretariats.

Research Information

Through IDRC's Research and Information Management Service (RIMS), IDRC staff, researchers in the developing world, and Canadians have access to the most up-to-date sources of information on research for development. These sources include databases of IDRC-supported researchers, those of other donors, IDRC's library holdings, and external sources.

Revenue Diversification

With more than 25 years of experience in the developing world, IDRC has acquired a sound expertise in the science for development field. IDRC is now applying this expertise to generate revenue and supplement its Parliamentary grant. Cofunding arrangements with other donors, contract research, and fundraising to finance specific projects all contribute to the Centre's commitment to funding scientific and technical research in the South.

IDRC's evaluation program has developed and applied innovative methods for assessing institutional performance and for measuring the effects of development interventions.

Training and Awards

A critical mass of experienced, trained Southern researchers is necessary for global sustainable and equitable development. To deal effectively with global development issues, Canadians need opportunities to broaden their perspective. IDRC's training and awards program supports activities to meet both needs.



1996 RESEARCH HIGHLIGHTS IN BRIEF

LATIN AMERICA AND THE CARIBBEAN

Model for Cooperation

Former UN Secretary-General Boutros Boutros-Ghali described CONDESAN, a Latin American sustainable-development consortium, as a model for further cooperation among development agencies. Created with IDRC support, CONDESAN will address the complex problems that now affect mountain ecosystems such as the Andes. CONDESAN prevents duplication of effort by donor agencies and promotes sustainable development in the Andean region.

Its 100 members are based in Europe and in North and South America. They include universities, NGOs, development donors, and other international agencies. Using electronic linkages, CONDESAN shares its knowledge base of Andean land- and water-management practices, crops, livestock, and policies with some 70,000 users. CONDESAN is helping improve food production and environmental management in an impoverished area known for severe strains on a fragile ecology.

CamBioTec

IDRC has launched a project that will encourage collaboration between Canada and Latin America and between the private and the public sectors to find biotechnology applications for the agricultural and environmental sectors.

CamBioTec will provide a forum to identify priorities for biotechnology applications and promote technology partnerships between companies and research institutions in Canada and Latin America. The initiative will also work to strengthen regulatory policies in Latin American countries to ensure effective monitoring of the social, economic, and environmental impacts of new biotechnology applications.

CamBioTec builds on past Latin American projects that identified key areas for biotechnology applications. In Mexico, for example, these included biopesticides for fruit and vegetable farming, animal vaccines, and pig and poultry waste treatment and use.

South-South Transfer

A forage legume developed and released in Peru is now grown on tens of thousands of Chinese farms. Known as *Stylosanthes*, it is used in China for a variety of purposes, including as animal feed and as a soil amendment for mango and rubber plantations. *Stylosanthes* was first developed with IDRC support in the 1980s as a grazing legume for Peruvian livestock. The legume has become well known throughout the region, thanks to the Colombia-based International Center for Tropical Agriculture, which field tested *Stylosanthes* through the IDRC-supported Tropical Pastures Network.



AFRICA AND THE MIDDLE EAST

Water

Canadian and Middle Eastern scientists are learning from each other in a Jordanian water-harvesting project. The project is helping Jordan capture and make the most efficient use of rainwater for food production. Scientists from Concordia and Moncton Universities are sharing with Middle East colleagues the highly technical computer skills that are needed for this kind of research but are not widely available in that part of the world. The Canadian scientists get a chance to apply their skills in an arid zone.

If the project succeeds, agricultural planning and policy-making will improve. Other arid lands in the region could also benefit. UNDP and the International Center for Agricultural Research in Dry Areas are partners in this venture.

Information

Top African experts are preparing an action plan to accelerate socioeconomic development in the continent and improve Africa's poor information and telecommunications infrastructure and facilities as part of an IDRC-supported research project. The lessons from this research could also benefit places outside Africa. Joining idrc in this effort are the International Telecommunications Union, the United Nations Educational, Scientific and Cultural Organisation (UNESCO), the Economic Commission for Africa, and Bellanet.

The project responds to ideas from African planning ministers and the UN Secretary-General's Special Initiative on Africa. It follows a meeting of 300 government, NGO, academic, and business leaders in Addis Ababa, Ethiopia.

Community-based management

Since 1988, household incomes in the poorest regions of Zimbabwe have quadrupled under the Communal Areas Management Programme for Indigenous Resources (CAMPFIRE). Rural residents now earn a living from ecotourism, safari hunting, and controlled sales of animal products. IDRC and its local partner, the Centre for Applied Social Sciences at the University of Zimbabwe, are now looking at the possibility of expanding the program into neighbouring countries that have expressed interest.



ASIA

Technology and environment

India produces enormous quantities of sewage sludge and fly ash, the residue from burning coal. Typically, these waste products are dumped directly onto land or flushed into waterways. Thanks to a process pioneered in India by a University of Western Ontario researcher, this waste may soon become a valuable resource.

A pilot study using a mixture of sewage sludge and fly ash as a soil substitute has proven effective in restoring degraded lands. It has also proven acceptable and attractive to local communities and governments. Researchers will now test the validity of the technology with a wider range of crops and plants.

Sustainable resource use

Half of the world's population lives less than 6 kilometres from the sea and, by 2020, three-quarters may do so. The pressure on coastal resources is immense. The Coastal Resources Research (CoRR) Network was formed to find local, sustainable solutions to biodiversity loss in the coastal regions of the world. Headquartered at Dalhousie University in Halifax, Nova Scotia, CoRR will link researchers from Asia, Latin America, the Caribbean, and Canada in an effort to provide sustainable alternatives for coastal communities. In the Philippines, CoRR is working with a network of academics, NGOs, and local communities to develop fisheries-management strategies and livelihood options that would protect the surrounding coral reefs. In Hue, Viet Nam, CoRR's interdisciplinary team is attempting to understand the ecological effects of economic and other activities on the complex Tam Gaing Lagoon.

Using diversity

IDRC is in the vanguard of institutions seeking to enhance and maintain genetic resources on small farms throughout the developing world. A recent workshop held in New Delhi, India, brought together farmers' organizations, NGOs, scientists, and research managers from universities and national and international research centres to make concrete plans to address the loss of biodiversity on farms. A tangible outcome of the conference was a proposal for a "Using Diversity Fund" that would enhance genetic diversity on farms by giving farmers access to a wider range of crop varieties.

Half of the world's population lives less than 6 kilometres from the sea and, by 2020, three-quarters may do so. The pressure on coastal resources is immense. The Coastal Resources Research (CoRR) Network was formed to find local, sustainable solutions to biodiversity loss in the coastal regions of the world.

JÉANETTE L. ANDREWS-BERTHEAU



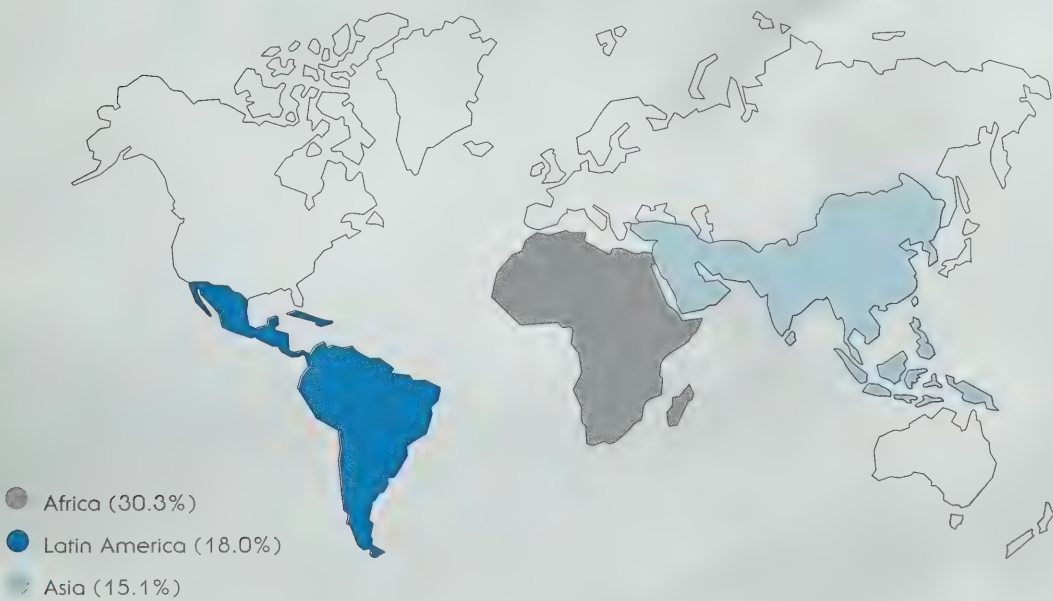
HOW IDRC SPENT FOR RESEARCH IN 1996

RESEARCH APPROPRIATIONS

In its program themes, IDRC funded a total of \$46.8 million in development research.

DISTRIBUTION OF RESEARCH IN THE SOUTH

The geographical distribution of IDRC's program appropriations is shown below. Of the three major regions of the developing world, Africa received the bulk of the Centre's support.



\$21.2 million (36.6%)
was appropriated for
global and corporate
activities.



A F R I C A



PIERRE ST-JACQUES

Micronutrient Deficiencies

Bednets for Malaria

Planning in Jinja, Uganda

Maize Yields Hope

Fungus Fights Cereal Killer



DENIS SING



One third of China's population is among those in the world most at risk of iodine deficiency.

MICRONUTRIENT DEFICIENCIES

A recent breakthrough in food-fortification technology that allows two essential elements – iodine and iron – to be added to table salt represents a major advance in international efforts to prevent health problems associated with micronutrient deficiencies.

For more than 20 years, scientists have tried without success to fortify salt with iodine and iron in such a way that the two micronutrients do not react and lose their potency. When iron and iodine interact, the amounts available for absorption by the human body is significantly reduced, explains Levente Diosady, a Professor of Food Engineering at the University of Toronto.

This breakthrough involves covering iodine particles with a capsule made from dextrin, a water-soluble starch compound, which serves as a physical barrier between the two elements. The double-fortification technology was developed with support from the Micronutrient Initiative (MI) and IDRC. The MI is an international secretariat based at IDRC that aims to eliminate health problems resulting from deficiencies in iron, iodine, and vitamin A.

Iodine-fortified salt was introduced in North America and parts of Europe during the 1920s as a means of combating iodine deficiency disorders in the population. Iodine is an essential component of thyroid hormone, a substance that contributes to brain development in

the fetus and regulates human metabolism. Iodine deficiency is the single greatest cause of preventable mental retardation in the world. Other related disorders include lethargy, physical disabilities, goitre, still-births, and neonatal deaths.

In theory, the combination of iodine and iron in salt can simultaneously combat iodine and iron deficiency disorders, which together affect more than one-third of the world's population. Iron deficiency is the most common nutritional problem in the world, particularly among women, infants, and children. Health problems associated with a lack of iron in the diet include anemia, fatigue, learning problems, pregnancy complications, premature births, and maternal mortality.

Iodine is naturally present in water and soil, although some soils contain very low amounts. As a result, seafood is a more reliable source of iodine than crop plants. Around 1.6 billion people in more than 100 countries live in areas where iodine is not available in sufficient quantities. Those most at risk include approximately one-third of the population of China. Iodine deficiency is also a severe problem in the Himalayas, the Andes, India, and West Africa.

Researchers at the Hospital for Sick Children in Toronto are testing the efficiency of absorption of iodine and iron in double-fortified salt into the human body. Later this year, the new salt will undergo further tests by University of Ghana scientists. The IDRC-funded trials will target women and their families in areas of Ghana where iron and iodine deficiencies are endemic.

<http://www.idrc.ca/books/reports/1996/17-01e.html>

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BEDNETS FOR MALARIA

Gbaguidi XII – the King of Savalou sleeps better now that he spends his nights under a mosquito net impregnated with insecticide. The practice could save many lives in his small kingdom in central Benin. After the rainy season, Savalou, 200 km. north of Cotonou, is also the kingdom of the *anopheles* mosquitos that transmit malaria. One of the world's most deadly diseases, malaria claims up to three million lives per year, a million of which are in Africa. Hardest hit are children under five.

14

Fagbedji Houehanu, village chief, claims that his life is no longer the same. "Before, I got up at about 3 a.m. and I never slept after that. Now, I get up at 5 in the morning. I sleep much better. If it was up to me, the whole village would be equipped with mosquito nets."

Cleopatra, Queen of Egypt, also slept under a mosquito net. Today, there is renewed interest in this method of preventing malaria. Despite encouraging results from tests in Tanzania on the anti-malaria vaccine developed by a Colombian doctor, an effective vaccine against malaria will not be available over the short or medium term. There is no longer any hope of eradicating the mosquito itself and drugs are increasingly ineffective against certain resistant strains. Therefore, the new approach of insecticide impregnation of bednets is one of the most promising avenues for limiting the number of deaths caused by malaria. In one of the areas where it was tested in Gambia, it cut the child mortality rate by more than half.

Researchers have been trying for the first time in Africa to find out why some people sleep under mosquito nets and to discover how to convince others to do likewise. Their test field: Benin, where less than 15% of the population use the nets. Over a 3-year period, researchers from Benin and Canada, funded by IDRC, sold tulle (the fabric used for making mosquito nets) curtains to 1,550 families in the Savalou region.

Survey takers who checked whether the families had used the fabric found general agreement that the new mosquito net provides undeniable benefits. In contrast to the traditional mosquito net, this net is light, transparent and permits air circulation. People are less hesitant about installing it during periods of intense heat. Impregnating the nets with an insecticide that is odour-free and harmless to users increases protection.

However, this apparently simple method is confronting certain barriers. The household head sometimes appropriates it for his own use, although the project has had some success in changing this behaviour by emphasizing the importance for children to be protected.

Local people are often unaware that only one mosquito bite can transmit malaria. The critical time for protection is around 1 a.m., the peak time of biting activity by the *anopheles* mosquito.

Disease of the Sun

Dr Achille Massougbdji, a parasitologist at the Centre national hospitalier et universitaire du Bénin (Benin's national university hospital), considers animist religious beliefs and lack of knowledge to be the main barriers to the use of mosquito nets. "When you ask people in their own language, you have to take into account that malaria is associated with the sun and excess use of peanuts and red palm oil. However, the linkage between the mosquito and the disease is not always made."

Economics also play a part in net use. The tulle, like the insecticide, has to be imported from Canada. Nigeria manufactures this fabric, but it is expensive and of poor quality. According to Christophe Codjo Gbaguidi, President of the Organisation savaloise pour la solidarité et le développement (OSSD), this increases its costs and makes its use more difficult. "When the funding ends, I do not know if they will still be within peoples's financial reach. We are looking for ways to produce them at lower costs". A tulle net currently costs CFA6000 (US\$17) and it costs CFA600 every 6 months to reimpregnate it, a problem for those coming from outside the region, or for those with limited incomes. Nonetheless, researchers believe that nets are being purchased by women in families where the woman's income is greater than the man's.



Marketing in the Bushland

A Savalou resident spends, on average, US\$35 per year on drugs, medicated strips, insecticide sprays, and medical bills to combat malaria. The researchers are trying to convince people that the mosquito net will become less expensive. The researchers distribute tee-shirts emblazoned with advertising slogans, run a poster campaign to sell mosquito nets at a promotional price, and bring theatre to the villages using the theme “the whole family under the mosquito net.” The sale of mosquito nets more than tripled last year.

At the Centre de promotion sociale de Savalou [Savalou Social Advancement Centre], about thirty seamstresses sew up the polyethylene tulle manufactured by a Montreal company, Rentex. “In the African family, it is the woman who takes care of the family’s health,” says Solange Laleye, who is the group animator. According to her, the project is seen as important and, therefore, enhances the esteem accorded to women. “In the beginning, their husbands were not too pleased because women spent less time at home. Afterwards, however, they realized that it was also to their advantage. There is less family illness. Now, no husbands are bitterly opposed to the project. They are the ones reminding their wives that it is time to go!”

The complete results from the user survey of the mosquito nets are not yet available. However, it is believed already that there has been an appreciable decline in the cases of malaria accompanied by anaemia in Savalou. These results are encouraging because, in addition to being one of the major causes of mortality, malaria, along with the guinea worm, is the main obstacle to the region becoming productive and developing. Christophe Codjo Gbaguidi believes that the benefits of the mosquito net strongly outweigh its limitations. He wants to extend the experiment to a much larger region and establish centres for impregnating mosquito nets. He is hoping for assistance from the Benin government and UNICEF.

Fagbedji Houehanu, village chief, claims that his life is no longer the same. “Before, I got up at about 3 a.m. and I never slept after that. During July, I was sick for 10 days, even with drugs. This year, I have felt some aches and pains, but I have had no malaria attack. Now, I

A. HAALAND



Lightweight mosquito netting impregnated with insecticide provides valuable protection against malaria transmission.

get up at 5 in the morning. I sleep much better. If it was up to me, the whole village would be equipped with mosquito nets. However, not everyone has the money to obtain one”. The piece of tulle has even received royal assent in Savalou. King Gbaguidi XII is converted. “Before, I used to scratch myself and I had to go to the hospital. I had a mosquito net, but it was not as well doused as yours. Now, I sleep very well. I don’t feel a thing.”

<http://www.idrc.ca/books/reports/1996/01-01c.html>

Robert Bourgoing, correspondent for Pêriscoop News Agency, reporting from Bénin.

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PLANNING IN JINJA, UGANDA

The Ugandan city of Jinja sits at the headwaters of the Nile River on Lake Victoria. This geographical fact led to the ascent of Jinja from small fishing village to Uganda's industrial heart. By the mid-1950s, the town had a hydro-electric dam, a developed service infrastructure, and a communication system fed by boat, rail, air, and road.

Despite this affluent base, Jinja could not escape the decline triggered by Idi Amin's expulsion of the Asian community from Uganda in 1972 and by civil war. By the end of the decade, the economy and industry were devastated, and investment nearly non-existent. Although new investment has flooded into Uganda since President Yoweri Museveni's National Resistance Movement (NRM) took power in 1986, most of it has gone to the capital, Kampala.

The same infrastructure that served Jinja in the 1950s is coming under further pressure as villagers move to town in search of work – swelling the already high numbers of unemployed. Even when services are available, many

Although the project is still at an early stage, the variety of responses from public participants are providing valuable information.

people – with an average per capita income of only US\$215 – cannot afford them.

Poverty has had far-reaching effects on the environment. The council has not built public pit latrines because there is running water available. Yet many people with access to water cannot afford to pay for the service, which means they are forced to dump their waste in public places.

Even the search for extra cash has burdened the environment. Many people have turned to rudimentary agricultural practices as a short-term generator of revenue, and have begun cultivating the wetlands that border the town. This practice, in turn, threatens the fish breeding grounds of Lake Victoria.



The Model Communities Program brings together various stakeholders within communities such as Jinja to plan strategic services.

Joseph Birungi Bagonza, Assistant Town Clerk and Coordinator of the Model Communities Program in Jinja, is confident that the municipal council can find ways to ensure the community receives the services that are now eluding them – and solve their environmental problems in the process. The vehicle is an initiative known as Local Agenda 21 (LA21), in effect, implementing Agenda 21 goals for sustainable development at the local level.

"Local Agenda 21 is very important," Bagonza explains. "This project aims to find models of community participation to help us."

Jinja is part of the global Model Communities Program coordinated by the International Council for Local Environmental Initiatives (ICLEI), which is based in Toronto. The project is an attempt to assess how the LA21 approach – in essence, participatory and sustainable development planning – works in different countries. ICLEI staff are available to provide training for local project teams and to help identify what forms of community participation in planning are appropriate in different cities – a key objective of the global program.

Jinja's two-year LA21 project began with an agreement between the council and ICLEI in early 1995, committing the council to preparing and evaluating a local action plan. So far, the council has held workshops for council members and formed a multi-sectoral team to help guide the project.

A stakeholder group – made up of representatives from churches, the chamber of commerce, service organizations, market vendors, women, youth groups and local council mem-



bers from parish to municipal level – was formed last year. A vital part of the process is to bring together people from diverse backgrounds to work on a common platform. Bagonza is currently helping to set up lower-level stakeholder groups for each of the three divisions in the municipality. When these are in place, the groups will begin identifying the environmental, social, and economic issues that the municipality should deal with first.

Although the project is still at an early stage, the variety of responses from public participants are providing valuable information. It has been difficult, for example, to make people fully understand how environmental issues relate to them. “It’s almost cultural. Ugandans have never had a problem with natural resources in the past, so they don’t see why they should have a problem now,” explains Bagonza.

Despite municipal councillors being deeply involved in the process, there have been surprisingly few political challenges so far, partly because the project has not yet developed enough to come into conflict with conventional planning processes.

The political smooth sailing that has prevailed until now is also due to the fact that the LA21 strategy complements the NRM’s own decentralization policies. As far back as 1987, the NRM instituted a system known as ‘Resistance Councils’ that encouraged local participation and self-governance from the village level up. As a result, most Ugandans are familiar with the idea of community participation – although not necessarily in the sectors that the Model Communities Program is asking them to work.

Devolution and Power

However, Konstantin Odongkara, ICLEI-funded researcher for the Model Communities project, warns that this situation may change as the project gets under way and the roles of people within the municipality are forced to change. “Once power starts devolving to the community and council resources start following it, there may be some resistance from councillors who may see it as a weakening of their influence,” he explains.

One problem, says Bagonza, is convincing stakeholders that they should take community

action on issues like sanitation that they see as the council’s responsibility. Because stakeholders feel that the problems fall within the council’s mandate – and because many do not feel the urgency of environmental problems – they are often unwilling to work for free. By and large, Ugandans are poor, and a day at a seminar to discuss environmental problems means a day unpaid. “If people have the choice of tending to their life or going to a meeting, they tend to their life,” says Bagonza.

The council cannot afford the transport and lunch expenses that are involved in attending meetings. As a result, members sometimes do not return to meetings – a situation that is demoralizing and could threaten the sustainability of the project.

Bagonza has tried to deal with the problem by starting a project to demonstrate that community action really can have direct economic benefits for participants. Jinja produces 25,000 tonnes of refuse a day – nearly all of it organic. Under council direction, a group of women have begun a small composting project on council-donated land to produce manure for farming.

Although the implementation of LA21 in Jinja still has some distance to go, both Bagonza and Odongkara are optimistic that the groundwork they are laying, and the problems they are overcoming, are essential to the eventual success of the program. They are also certain that any lessons they learn can be transferred to other towns in Uganda, many of which face similar problems. “We are still in the process of developing this project. We are talking about what we have seen and we are looking forward to getting feedback from other participating municipalities,” says Odongkara. “We feel that we have more allies every day.”

<http://www.idrc.ca/books/reports/1996/09-01c.html>

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MAIZE YIELDS HOPE

Burundi, a nation struggling to avoid the social devastation that has tragically afflicted neighbouring Rwanda, appears at least to have overcome a threat to its food security. Using locally available maize populations, an IDRC-supported research team has developed several high-yielding varieties resistant to the African maize streak virus. This virus is among the worst of several plant diseases to attack maize, an important staple food throughout eastern and southern Africa.



Dunstan Malithano played a key role in building Burundi's capacity for maize breeding research.

The streak virus, carried by a leafhopper insect (*Cicadulina spp.*), can decimate an entire maize crop. Historically, it has been more prevalent at lower altitudes, but in recent years the virus has increasingly affected crops grown at higher altitudes.

In 1978, ISABU, Burundi's national agricultural research institute, secured IDRC's help in establishing a maize-improvement program. The aim was to breed high-yielding maize varieties resistant to streak and other diseases, and adapted to farmers' needs in Burundi's different ecological zones. The research team tested both local and foreign maize varieties, including high-altitude lines. However, this material was poorly adapted to local conditions and quickly succumbed to the maize streak virus.

<http://www.idrc.ca/books/reports/1996/19-01e.html>

Andrew Ker was senior IDRC program officer responsible for crops and cropping systems projects in eastern and southern Africa, from 1987 to 1992.

Dunstan Malithano was scientific advisor for IDRC on the Burundi maize improvement program.

The highest yielding introductions at the Kisozi maize research station in Burundi (located 2150 metres above sea level) were hybrids bred at a similar altitude at the Kitale station in Kenya. However, these varieties generally took eight or nine months to harvest. Farmers in Burundi preferred varieties that matured in four or five months, giving them time to plant another crop after the maize or plant two maize crops a year.

On Burundi's Imbo Plain, maize varieties adapted to the 800-metre altitude environment were needed. Intensive screening of maize obtained from the International Institute of Tropical Agriculture (IITA) in Nigeria identified one variety adapted to the Imbo Plain and preferred by farmers.

In 1985, Dr Dunstan Malithano, a Malawian researcher who had worked for IDRC in Mozambique, joined the team. He reorganized the breeding program to place greater emphasis on improving local maize populations, rather than making selections from exotic varieties and developing hybrids. Maize from other countries often fared poorly in Burundi and farmers rejected them. By contrast, new varieties based on local populations were readily accepted by farmers and consumers. This approach also meant that farmers would not have to buy hybrid seeds every year.

Within two years, superior maize varieties were distributed to farmers, while the researchers continued developing better and higher yielding varieties. By 1989, the team had developed three high-yielding varieties resistant to streak disease: "Mugamba I" and "Isega I" for the high and medium altitude areas, and "Imbo I" for the lake-shore and Imbo plains. Imbo I was also a suitable replacement for barley in the Burundi Brewery.

Dr Malithano negotiated with the brewery to multiply his improved maize varieties. After one growing season, the brewery had produced enough seed for a limited number of farmers, who in turn generated 43 tonnes of seed. The new variety was then sold to farmers throughout the Rift Valley, who sold part of their crop back to the brewery for further distribution or brewing.

By 1994, some 80% of all Burundi maize growers were growing the streak-resistant varieties successfully. There was also interest in the new maize varieties from neighbouring countries such as Kenya because of the rapid spread of streak disease there. An important legacy of the maize improvement program is that Burundi researchers have been trained to take over the breeding program completely.



FIGHTING A CEREAL KILLER

When the head of a family farm in Mali looks out over crops of maize or millet and sees a vibrant pink flower spreading throughout the family's land, the farmer knows that the damaging weed named striga has returned. Each striga plant yields thousands of seeds, which means that next year's cereal crop will likely be damaged as well, by a weed that chokes the roots of other plants and leaches nutrients that would otherwise nourish cereal plants.

Striga is a serious constraint to sorghum, millet and maize production in the dryland zones of Africa, accounting for crop losses as high as 70% among subsistence farmers. Striga is also a problem in sub-humid to humid regions. It is estimated that two-thirds of the 73 million hectares devoted to cereal crops in Africa are seriously affected by striga, which thrives under conditions of low soil fertility and decreasing plant diversity. The overall revenue loss from striga in Africa is estimated at US\$7 billion per year.

In 1991, IDRC funded a team at McGill University in Montreal to search for substances in African soil that could control the cereal-killing weed. Although striga has no known natural enemies, the researchers identified a hundred promising fungal pathogens in Burkina Faso, Niger and Mali. In experiments conducted in Canada, eight of the soil pathogens proved effective in stopping the striga weed. Studies showed that the most deadly foe of striga, *Fusarium oxysporum*, is not toxic to humans and causes no harm to cereal crops.

In 1995, the scene shifted from a quarantined facility at McGill to testing in a sorghum field in Mali. The results were dramatic. Eighty-five percent of the striga weed was wiped out at the seedling stage by the *Fusarium* fungus, which had been grown on sorghum waste, dried, and then spread over the fields. At harvest time, there was almost twice as much grain and 70% less striga.

While such data are encouraging, Dr Alan Watson and Marie Ciotola of the McGill Biopesticide Research Laboratory caution that further studies are needed to evaluate the effectiveness of *Fusarium* under different climate and



Striga, which chokes the roots of cereal plants, affects dryland and sub-humid to humid zones of Africa.

soil conditions. By 1999, the McGill team – which is collaborating with the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and Mali's Institut d'Économie Rurale – expects to have more conclusive results.

One of the most encouraging properties of the *Fusarium* fungus is that it is relatively easy to multiply. In the next phase of this project, team members will seek the input of Malians and visit local villages to see whether *Fusarium* production could be handled by individual farmers or by cooperatives set up for this purpose. The dried fungus, which can be stored for months without any measured reduction in potency, will eventually stay in the hands of local farmers. If all goes well, someday they can spread the fungus on their fields, preventing them from turning pink with striga and ensuring an abundant grain harvest for their family and their neighbours.

<http://www.idrc.ca/books/reports/1996/28-01e.html>

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A Better Bean

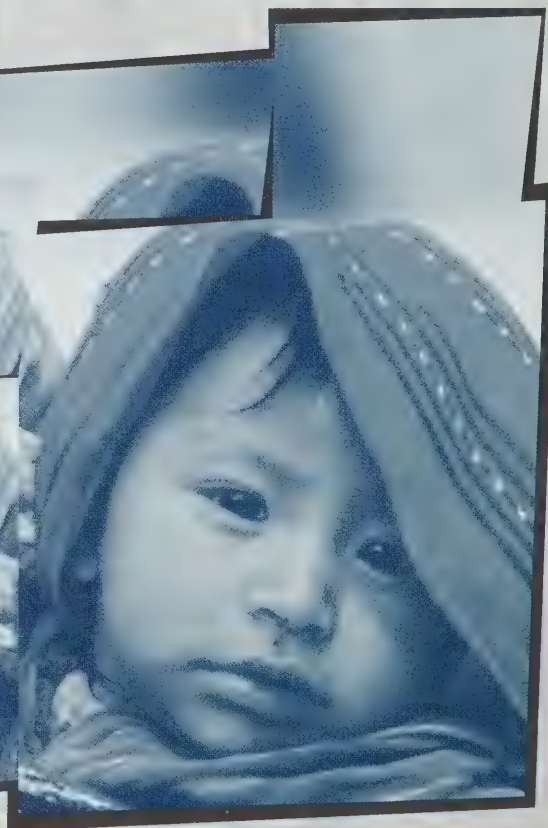
Mixed-Market Economics

Monitoring Sustainable Development

Economic Development in the Yucatán

Calakmul Model Forest

The Costs of Mining



DANIEL BUCKLES



Horizontal resistance breeding techniques can be applied to beans — grown here in a harvested corn field — and to other crops.

A BETTER BEAN

Researchers in Mexico and Canada have dramatically boosted the yield of a major Mexican food crop using an unconventional breeding technique that harnesses the power of multiple resistance genes to protect against a range of plant pathogens.

Using horizontal resistance breeding, scientists from the Colegio de Postgraduados in Montecillos, east of Mexico City, — in partnership with the University of Guelph in Canada — have more than tripled the yield of locally grown black beans — without the help of pesticides.

In 1963, J.E. Vanderplank, a South African plant pathologist, coined the terms “horizontal” and “vertical” resistance to describe the different kinds of resistance found in crop plants. Vertical resistance, which involves a single gene, is a temporary form of genetic resistance that breaks down as new pathogens appear on the scene. Horizontal resistance, which involves many genes, is a more durable form of resistance to disease or insects.

To protect crop plants from parasites, most breeders use classic Mendelian breeding techniques to transfer a single gene from a wild plant into a cultivar (cultivated variety), a process that enhances its vertical resistance. This involves crossing a wild plant with a cultivar to generate a hybrid variety, then backcrossing the hybrid offspring with the cultivar parent for several generations until the hybrid is identical to the cultivar but carries the wild parent’s resistance gene.

“[Unfortunately], when plants are being bred for vertical resistance, or they are being bred

[to improve] yield and crop quality under the protection of insecticides and fungicides, the level of horizontal resistance tends to decline,” says Raoul Robinson, a Canadian crop scientist and member of the IDRC-supported plant breeding team. “We have actually been increasing the susceptibility of many of our crops to their parasites. Most of the [vertical] resistance breeding programs of the twentieth century have totally failed to achieve their original objectives.”

Since 1991, Dr Robinson has worked with Dr Roberto Garcia Espinosa, the Mexican project manager, to attempt horizontal resistance breeding in black beans — a process in which the best individuals from each generation are selected and bred with each other. After only two breeding cycles, each cycle lasting about a year in duration, the team achieved yields of 1,500 kilograms per hectare without using pesticides. By comparison, the average bean yield in the Mixteca region of Mexico is 400 kilograms per hectare using pesticides. This is good news for the approximately 200,000 small-scale farmers in the area, who cultivate over 300,000 hectares, of which 40,000 are beans. Moreover, the breeding techniques developed in Mexico can be used almost anywhere and on most kinds of crops.

Dr Robinson is the author of *Return to Resistance*, which features a how-to guide for amateur plant breeders interested in selecting for horizontal resistance. In addition, he helped to establish the world’s first horizontal breeding club at Universidad Autonoma de Chapingo in March 1995. To date, its 76 members have collected more than 3,000 bean varieties from all over Mexico and are considering launching additional clubs for breeding potatoes, wheat, onions, and peanuts.

<http://www.idrc.ca/books/reports/1996/18-01e.html>

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Return to Resistance: Breeding Crops to Reduce Pesticide Dependence IDRC and Ag Access, June 1995
436 pp., ISBN 0-88936-774-4, CA \$30.00 (\$18.00 in developing countries)



MIXED-MARKET ECONOMICS

Master's students in economics at the University of Havana are busy learning free-market concepts that may seem abstract now, but are fast on their way to becoming reality in Cuba.

Under an IDRC-funded program, 15 Cuban students are completing a unique one-year master's program in economics designed to improve understanding of market economics and to foster development of the expertise necessary to manage Cuba's transition to a mixed market economy. To meet these goals, the program is focusing on strengthening the research capabilities of Cuban teachers and improving their course material. It also provides funds for a small grants competition.

In the program, around a dozen professors – half of them Canadian and the rest Latin American – teach courses modeled after Carleton University's master's program. Fifteen students graduated in 1995, the first year of the program. Their research papers included an examination of the "dollarization" of Cuba, a preliminary study on the social effects of the recent economic changes in Cuba, and a report on the impact of foreign investment.

According to Lourdes Tabares, the program's coordinator and an economics professor at the University of Havana, the idea is to help academics "teach new content and courses in fields in which we have little experience." The program involves a sort of trickle-down learning. Most of the participating students are junior economics professors from other universities

who intend to return to their schools and share what they have learned. In addition, they plan to conduct research on mixed market economics.

This year, six of the 15 students are junior bureaucrats from different government ministries. Thus, Tabares views the program as an opportunity for introducing mixed-market economic concepts in Cuban government circles. "We do not participate in the decisions taken regarding the recent economic changes. The government ministries are the ones doing this," she comments.

For now, many of the subjects covered are difficult for Cubans to grasp. "We have to use our imagination to understand how things such as changes in interest rates happen. A free-market economy is not Cuba's reality," says Master's student Mario Rosa Moreno Fernandez.

Not yet, but soon. Pressed by worsening economic conditions, in mid-1993 Cuba adopted measures aimed at liberalizing the economy, after more than 30 years of central planning. For the first time since Fidel Castro took power in 1959, Cubans were allowed to own dollars and run private businesses to earn foreign currency. Also for the first time, foreign investment was welcomed in joint ventures with the Cuban government.

In 1994, Arch Ritter, an economics professor at Carleton University in Ottawa, and Gary McMahon, a former program officer at IDRC, conceived of the master's program during a mission to Cuba. They found that the pace of change toward a market-oriented economy in Cuba exceeded the country's capacity to effectively manage the change. "We realized that there was no potential to do mixed market economy research. So we decided to try to build up a core of researchers," explains McMahon.

In the program, around a dozen professors – half of them Canadian and the rest Latin American – teach courses modeled after Carleton University's master's program. Cuban faculty act as professorial associates. Some of the courses explore the experiences of countries whose economies are similar to Cuba's, using case studies from Latin America and eastern Europe. Other courses provide a theoretical foundation for students, covering topics such as microeconomics, macroeconomics, and econometrics.





Measures to liberalize the Cuban economy are bringing home the realities of a free-market system.

Fifteen students graduated in 1995, the first year of the program. Their research papers included an examination of the “dollarization” of Cuba, a preliminary study on the social effects of the recent economic changes in Cuba, and a report on the impact of foreign investment.

These papers reflect changes that are visible everywhere in Cuba. For example, the sparkling Melia Cohiba Hotel, a joint venture between the government and a Spanish company, rises above the crumbling streets of Havana. Fruit markets have emerged where Cubans can now sell excess produce. And privately run restaurants, called paladares, have sprung up in people’s homes.

One woman, who runs a paladare in her two-bedroom home in Havana, says the new business has greatly improved her family’s life. “I work very hard all day to run this restaurant. We pay a lot of taxes, but it was worth it to get into the business,” she says.

Many of the changes are legal, others less so. Taxi drivers offer to take tourists to cheap rental accommodation and leave their cards for future reference. Signs announcing *se permuta* (“for swap”) can be seen in some areas of Havana where, technically, homes cannot be sold. In tourist areas, prostitution has become a way of life for many trying to earn some dollars.

The Cuban government still provides free or subsidized education, housing and health care, and gives its citizens basic food rations. But there is a dire shortage of food, medicine, and consumer goods. The “dollarization” of the

economy and the explosion of free-market activity has widened the gap between those who own US currency and those who don’t. For those who don’t, wages are low, averaging US\$15 a month.

“We are studying the effects of these changes on society. We are looking at the direction in which Cuba is going,” notes Tabares. Tabares’ colleague, Professor Nelida Gancedo, adds that Cubans “still aspire to have a nationally planned economy but within the framework of the circumstances imposed by the international economy.”

IDRC’s funding of the master’s of economics program expires this year. Organizers are currently seeking financial assistance from other donors to establish an expanded program that would also include courses in English, biology, communications, and women’s studies.

<http://www.idrc.ca/books/reports/1996/24-01e.html>

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MONITORING SUSTAINABLE DEVELOPMENT

For 10 years, the Fundación Pro-Sierra Nevada (FPSN) de Santa Marta has worked on small environmental and development projects in the Sierra Nevada mountain range of Colombia's Caribbean coast. The Sierra Nevada is considered an ecological treasure: containing tropical forests, snow-capped mountains, dozens of rivers, and many unique species of plants and animals. It is also home to a major archaeological site, called the "Lost City" of the ancient Tayrona Indians.

But the Sierra Nevada is also rife with violence. Conflicts between guerrillas, paramilitary groups, and the Colombian army occur on a daily basis. And over the past 25 years, it has been significantly deforested, with just 15% of its original forest left standing today. This began with an influx of peasant farmers fleeing the violence in other parts of Colombia and looking for land to clear for farming. The deforestation continued during the marijuana "bonanza" of the 1970s and 80s, during which more than 100,000 hectares of forest were cleared for marijuana fields.

Despite these setbacks, staff at the Fundación felt they were making some inroads into sustaining a unique ecosystem under pressure. Since 1994, however, the Fundación has assumed the role of "guinea pig" in a groundbreaking initiative that is forcing its researchers

and policymakers to rethink their whole approach to sustainable development.

With IDRC-funding, a Colombian research team in partnership with IUCN (World Conservation Union) experts is field testing and expanding a new assessment tool known as PRAM – Participatory and Reflective Analytical Mapping. The PRAM project is part of a larger initiative launched by IDRC and IUCN to develop, test, adapt, and refine various methods and tools for assessing sustainability in Asia, Africa, and Latin America.

The PRAM approach is based on a software program, called Map Maker, that was designed by development consultant Eric Dudley in collaboration with IUCN and other agencies. Map Maker allows users to create simple maps using complex environmental and social information on any geographic area from the farm level to the planet. These maps can then be used by researchers and policymakers to assess the degree of sustainable development throughout the target area.

Alejandro Imbach, a member of the PRAM team, says this assessment tool was long overdue in the field of international development research. "We have failed a great deal in development aid in the past 50 years, so we need to rethink how we're carrying out this work. Most projects that fail [do so] because no one is trying to assess what they're doing," he says.

According to Natalia Ortiz, one of the team members, PRAM allows development groups to make rapid and informed decisions. "Most organizations that work with the environment have filing cabinets full of information, but don't know how to use it effectively. You have to read through all the documents to make a decision but the reality changes all the time [and you don't have] time to stop and read all the material," she explains.

The PRAM methodology is based on the idea that sustainable development depends on both environmental and social factors. In other words, explains Imbach, if either the environment or the social situation is poor or not improving, then the system is unsustainable.

In Colombia, the PRAM team focused on the six social and environmental indicators they felt would have the greatest impact on sustainability. The team gleaned most of the environmental data it needed from the Fundación's files. To gather the social data, the team invited



RHODA METCALFE

Communities of the Sierra Nevada mountains are the site of field testing for new methods to assess sustainability.



PROGRAM SIMPLIFIES CARTOGRAPHY IN THE FIELD

Good maps are often required for the successful planning and execution of research and development projects. But creating a useful map can be a time-consuming and difficult chore. A new software program, called Map Maker, can help those without cartographic experience produce basic electronic maps in as little as 15 to 20 minutes. Map Maker is handy for mapping fields, forest paths, urban developments – even objects on an archaeological site.

The program – a simple geographic information system or GIS – is designed to create and manipulate maps on IBM-compatible computers that run Microsoft Windows. The results can then be saved and shared electronically, printed, or used in other GIS programs. Map Maker was designed by Eric Dudley, an independent consultant on community-based development aid based in Cambridge, England.

Map Maker was developed in collaboration with several institutions, particularly the World Conservation Union (IUCN), the Centro Agronómico Tropical de Investigación y Enseñanza (CATIE), and the Asia desk of the United Nations Centre for Human Settlements (UNCHS). In addition, IDRC is contributing to the production and distribution costs of a Map Maker manual. The GIS program is currently being used by more than 1200 people in over 80 countries.

According to Dudley, Map Maker suits a variety of tasks. In addition to applications involving the management of natural resources, the software has been used for urban mapping in Afghanistan by organizations working on post-war reconstruction. Instructor Alejandro Imbach has also used Map Maker to teach elementary school students in Costa Rica how to create simple maps for school projects.

<http://www.idrc.ca/books/reports/1996/22-01e.html>

municipal and community leaders, agricultural representatives, and other experts from around the Sierra Nevada to provide input.

At this point, the team rated each of the 11 municipalities in the Sierra using the environmental and social criteria and fed these numbers into Map Maker to generate a series of colour-coded maps. According to Ortiz, although the system is still at an early stage, the analysis proved useful. It found that the three eastern municipalities – in the isolated Guajira department – have the highest level of social despair and some of the weakest economies. This situation is partly due to political violence as well as to very low levels of government assistance.

Up until now, the Fundación has also largely ignored this region. “A lot of surprises came out of this analysis,” says Ortiz. “We started to understand that we don't have homogeneous information about the entire Sierra Nevada region. The areas we don't have any information about are the municipalities in the worst conditions, both environmentally and socially.”

For many municipalities, the Fundación had environmental data, but little idea of the social conditions. “We started to understand that sustainability is a process that links the two sides: environmental and social. And if the Fundación cannot work on all these issues itself, it needs to start making links with other institutions or government departments so the issues are addressed. Because if not, the process of sustainable development is going to be unbalanced and very slow. And we won't generate the changes we're looking for,” concludes Ortiz.

<http://www.idrc.ca/books/reports/1996/27-01e.htm>

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ECONOMIC DEVELOPMENT IN THE YUCATÁN

Many thousands of kilometres separate Cape Breton in eastern Canada and the Yucatán Peninsula of Mexico. But the plight of both regions is all too familiar to Greg MacLeod. He knows that thousands of jobs in fishing, coal-mining, and forestry have disappeared from Cape Breton Island in recent decades. Similarly, 50,000 jobs have been lost in the Yucatán since 1982 following the decline of the region's hemp trade, notes Dr MacLeod, a philosophy professor in the Tompkins Institute at University College of Cape Breton.

In the early 1970s, Dr MacLeod helped launch a community-oriented economic development corporation in Cape Breton. Today, New Dawn Enterprises has assets of around \$15 million and employs over 100 people in the housing and home care industries. MacLeod is also a founding member of BCA Holdings, which helped create another 100 local jobs by financing a radio station, a hotel, a commercial development, and a rope factory.

In 1992, with the North American Free Trade Agreement looming, Dr MacLeod traveled to Mexico. He hoped to apply the economic development strategies tested at home in a Mexican region similar to Cape Breton. He chose the Puuc region of Yucatán, where a local cooperative called Chac Lol was struggling to rebuild the shattered campesino (farmer) economy.

That trip resulted in the Yucape project, a three-year initiative launched in 1993 with finan-



Collaboration among local NGOs, and Mexican and Canadian universities is intended to improve income-generating opportunities for Yucatán residents.

cial support from IDRC, which is also providing expert advice on economic development. Dr MacLeod sees his role as helping Chac Lol adopt modern business methods through strategic links with universities. He believes that universities have a moral obligation to provide community development corporations in impoverished regions with essential technology and expertise.

To help foster the development of new community businesses, BCA Holdings established a small loan fund for Mayan entrepreneurs, and Chac Lol leaders Rommel Gonzales and Esther Muñoz visited Cape Breton for a closer look at how BCA Holdings operates.

So far, the Yucape team has been active in ventures ranging from tortilla production to sheep farming. Following an aboriginal tourism conference in Venezuela, the team has also started laying the foundations for an ecotourism business in the Yucatán by tapping local expertise.

For example, Mayab University conducted a business feasibility study for an ambitious hotel complex based on ecotourism. The senior class of Chapingo University's Faculty of Architecture designed a 20-duplex hotel, complete with botanical gardens, arboretum, and zoological park. Biochemists at the University of Yucatán are supervising plans for a medicinal garden. And Mexico's National Institute for Anthropology and History, which oversees national historical sites, is providing advice on social and cultural issues. The next step is to raise the funds required to build the hotel complex.

For Dr MacLeod, the Yucape project shows "that it is possible to take a community group in a marginalized economy, link it with a university, and inject the kind of methodology you need to make a successful business."

<http://www.idrc.ca/books/reports/1996/21-01e.html>

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CALAKMUL MODEL FOREST

Even Disney's animated feature film, "The Lion King," has a role to play in the protection of Mexico's tropical forests. Providing appropriate video entertainment is part of an education strategy developed by environmental educator Gloria Tavera to promote conservation and sustainable forestry practices in the Calakmul area of Mexico's Yucatan Peninsula.

According to Tavera, "The Lion King" demonstrates the importance of the food chain and reinforces the idea of individuals working together to promote the needs of a community. In Calakmul communities, particularly those that lack electricity, screening films such as "The Lion King" is a way of encouraging public gatherings where environmental issues can be discussed.

The video screenings are part of the Calakmul Model Forest Program, an initiative that promotes the partnership of environmentalists, industry, and local communities to find ways to manage natural resources in a sustainable manner. Tavera's job is to demonstrate how sustainable forestry practices can benefit local communities. The Calakmul Model Forest is part of an international network of 18 model forests – that are operating or in development – located in five countries, which is coordinated by a secretariat at IDRC headquarters in Ottawa.

The aims of the Calakmul Model Forest Program are to ensure ongoing harvests of food, wood, and other useful products; to enhance the standard of living of the local inhabitants; to raise awareness of conservation; and to promote ecotourism. In support of these goals, Tavera gathered information and conducted demographic surveys to identify the best approaches for her educational activities. Because more than 50% of the local population is under the age of 15, ethnic diversity is high, and literacy rates are low, she realized that written material would not be particularly effective. Preliminary studies also indicated the need to target women and children.

So far, the Model Forest Program has established a wildlife station housing puma, jaguar, and wild pigs. Another initiative is the Calakmul Botanical Gardens featuring nature trails and facilities that showcase an impressive array of local flora, including edible plants and 56 species of orchids native to the region. The six-hectare parcel of land is owned by the region and provides a base for workshops, information sessions, and educational tours to the local Mayan ruins.

Other programs have brought local women together to exchange ideas and share information on the profitable use of forest products. In 1995, a regional food fair provided opportunities for participants to sample and compare food, arts, and crafts – and also to watch a fashion show highlighting a variety of local products. The displays demonstrated how to contribute to the local economy by adding value to forest products.

As a result of the fair, beautifully embroidered clothes incorporating traditional designs are now being sold as souvenirs to tourists visiting the Calakmul ruins. In addition, a cookbook has been published that features 127 recipes – including many exotic dishes made with Calakmul forest products. The 1996 fair, to be held this summer, will likely add more tasty recipes to the savory collection.



Handicraft production is among the measures taken in Calakmul to improve incomes and promote sustainable forestry.

As part of the educational strategy, Tavera is indirectly targeting the 2,500 primary school children in the area through environmental workshops for their teachers. The workshops cover everything from ecotourism and insect collecting to the basics of bird watching and are intended to cultivate an appreciation for the environment among children and adults alike.

<http://www.idrc.ca/books/reports/1996/23-01e.html>

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THE COSTS OF MINING

Latin America is open for business in mining. Over the next four years, the region's mining sector will attract nearly US\$30 billion, or 35% of all international investment in mining, the Latin American Organization of Mining reported in May. But environmental legislation is also on the agenda as many countries enact laws to balance investment with controls on environmental pollution.

Higher prices for minerals and economic and political stability have enticed international mining firms to reconsider countries such as Peru. President Alberto Fujimori's government, first elected in 1990, cut inflation and all but ended conflict with the Shining Path revolutionary movement. New laws encouraged foreign investment by removing restrictions that limited mineral exports or required Peruvian ships as carriers.

The government has created a stable environment for international investment, says Alberto Pasco-Font of Grupo de Análisis para el Desarrollo (GRADE) an independent economic research group in Lima. "There is a lot of stability required because you don't go into a country unless you know what the taxes are." Stability and high mineral prices enticed US giant Newmont Mining to invest US\$100 million in the Yanacocha gold mine, the first major investment in Peru in more than 20 years.

Simple mathematical models of the mining sector are being built to calculate the fiscal effects of various taxes and subsidies to replace command and control regulations.

Pollution costs on agenda

While mining represents more than 40% of the foreign exchange earned by countries such as Peru, Bolivia and Chile, pollution and its cost are also on the agenda. In Peru and Bolivia, media stories regularly express concerns about mining effluence in rivers and streams. Air pollution in Santiago is a recognized issue that triggers yearly losses of US\$435 million dollars through health-care costs and industries being forced to close, the University of Chile estimated in 1994. While cars are a major source of pollutants, 180 of Santiago's largest industries were closed in June this year because pollution reached dangerously high levels.

Therefore, at the same time as these countries actively encourage investment, they have also been drafting new environmental legislation. An example is Chile's 1994 Environmental Framework Law, which sets standards for various sectors, including mining.

Peru's 1991 mining law requires companies to meet government standards. Working from base-line studies of each mine detailing current levels of effluence, the mining companies "have to have a plan or program to reduce the pollution," and present it to the ministry, says Jose Mogrovejo Castillo, director general, Peruvian Ministry of Energy and Mines. "They have five years (to meet these targets) for mining operations and ten years for smelters," says Mogrovejo. Non-compliance can lead to fines between US\$500 and US\$500,000.

Drawbacks of regulations

In Peru, as in other countries, these command and control regulations have serious limitations, says Alberto Pasco-Font of GRADE. They require a very large bureaucracy to enforce, says Pasco-Font. In addition, enforcement can be avoided by mine owners who may plead that they cannot afford the pollution reduction program and ask not to be fined. In the end, "it is cheaper to lobby and postpone the whole thing" than to make significant changes in production, he says.





The fiscal importance of mining investment in the Andes must be balanced against environmental controls.

Pasco-Font is one of three researchers exploring alternatives that can overcome the limitations of command and control regulations. Supported by IDRC, Pasco-Font, José Miguel Sanchez of ILADES in Chile and Juan Antonio Morales from IISEC Bolivia are examining ways to use the tax system to help create economic incentives to protect the environment.

Paying the whole price

"The whole point of using economic incentives is that the mine will internalize environmental costs," says Pasco-Font. For example, a "green tax" could encourage firms to invest in more efficient technology by increasing production costs for old technology until a mining company switches to a more efficient production method. Internalized environmental costs become part of the mine's cost structure; hence mine operators have an incentive to reduce such costs. Under the old way of operating, environmental damage cost society but not the mining company itself.

While part of the research is at the micro level, examining the operating patterns of individual mines, most of it deals with identifying policy tools that will allow governments to judge the impact of different taxes at a macro level – on international investment, exports, and levels of pollution.

Simple mathematical models of the mining sector are being built to calculate the fiscal effects of various taxes and subsidies to replace command and control regulations. Further models that employ different sizes of mines and different technologies will define the impact on investment and long-run production.

In the end, researchers will provide the government with alternatives to command and control regulations by identifying ways to predict the impact of new taxes on investment, exports, and pollution. In effect, it will identify the different compromises possible between environmental protection and economic development as well as the effects on the fiscal budget.

Internalized environmental costs become part of the mine's cost structure; hence mine operators have an incentive to reduce such costs. Under the old way of operating, environmental damage cost society but not the mining company itself.

<http://www.idrc.ca/books/reports/1996/34-01e.html>

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*The PAN Mongolia
Experience*

Better Sewage Treatment

Water Policy in Manila

Ecotourism in Thailand



THE PAN MONGOLIA EXPERIENCE

If you were to pick a country least likely to join the global communications network a few years ago, Mongolia would have been an easy choice. With deteriorating or non-existent infrastructure, a tightly controlled media, and a one-party state political system, the country was isolated from much of the world. Yet today Mongolia is embracing the Internet and its free-flow of information as quickly as its fragile economy will allow. This despite a severe lack of finances and an outdated telecommunications system.

Mongolia's first Internet host was born when local software and networking company

Today Mongolia is embracing the Internet and its free-flow of information as quickly as its fragile economy will allow. This despite a severe lack of finances and an outdated telecommunications system.

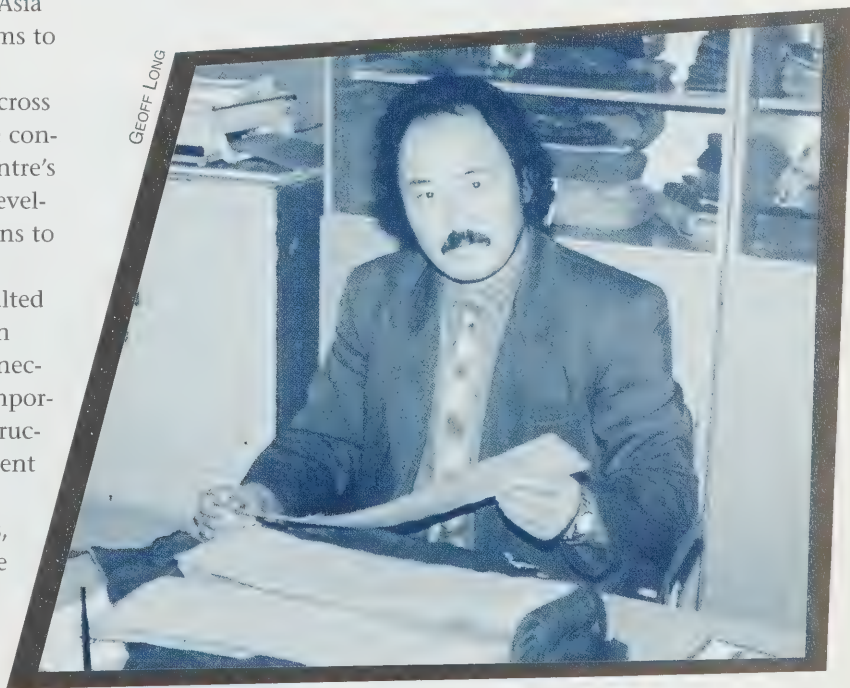
Datacom was assisted through IDRC's Pan Asia Networking program. The PAN program aims to fund communications infrastructure and research projects in developing countries across Asia. In turn, this infrastructure can enable content-based subnetworks in line with the centre's research priorities and allow individuals, development institutions, and other organizations to share information.

From that first partnership, which resulted in a low-cost dial-up Internet connection in 1994, has evolved a dedicated satellite connection providing full Internet access. More importantly, it has provided the technical infrastructure necessary for other technical and content programs. Today, users include the Prime Minister through to people in remote areas, development agencies, universities, and the new businesses of a fledgling market economy.

Changing Priorities

Mongolia's transition to a market system has not been easy. When the Soviet Union collapsed in 1991, so too did many of the subsidies and trade that had been underpinning its economy. According to Surenguin Badral, the foreign policy adviser to the Prime Minister, one of the central tasks of the new government is to reduce its spending and at the same time improve infrastructure. However, with limited funds and many priorities, including the provision of basic services such as electricity to remote areas, the task is long-term. Says Badral, "In this way the Internet network that the country is starting to build up is most important in terms of first of all reducing costs and secondly communicating with the country people and getting information from remote places."

When Datacom, a former state-owned enterprise, first had the idea to start an Internet service, lack of funds was the major stumbling block. Datacom's director-general, Dr Enkhbat, says that without IDRC's offer of technical and financial assistance, the project would not have been possible. Just as important, he says, is that it provided an example to other organizations of what was possible and a technical base for developing other projects.



Apart from its publishing potential, D. Batkhuyag values the Internet as a means of sharing his scholarly interest in traditional Mongolian texts, or sudars.



Desperate for Information

Mongolia was the first site chosen in the PAN program. In this regard, the PAN-Mongolia project can be seen as a pilot to assess how assistance might also be offered to other developing countries in the region. The country was chosen for a number of reasons. Having only recently made the transition to a market economy, it is in desperate need of information from the rest of the world and ready to re-forge links with neighbouring countries. Datacom, the only domestic provider of data communications services, also had a team that could undertake the demanding technical requirements needed to become an Internet provider. And as a remote country without Internet access, it offered a chance to study the technical challenges that would be applicable to other countries in the region.

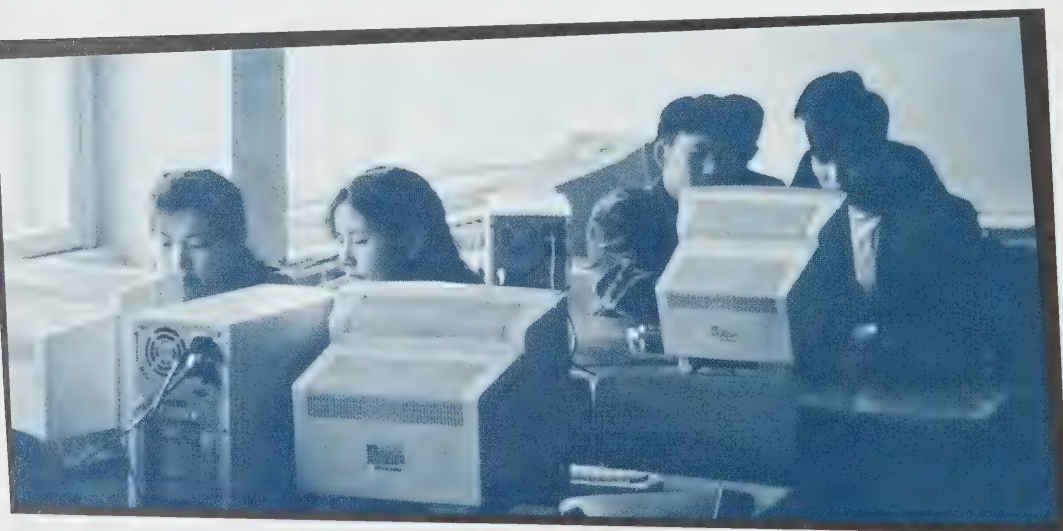
Paul Wilson, a consultant from Australian-based networking company Pegasus Networks, was involved in the project as a technical advisor in the preliminary stages. He was impressed by the technical capabilities at Datacom at the time and, as a result, the likelihood of success. As he notes, "they were clearly out there and ready."

Homegrown Solutions

However, he also points out that the conditions that they had to work with were poor, although similar to many other developing countries in Asia. Problems included unreliable telephone lines, telephone exchanges based on non-standard and outdated Russian technology, erratic power, and few computers. However, even at this early stage, Datacom had built up its own messaging system, adapted from Russian software, which was robust enough to cope with the conditions. According to Wilson, the system, called PC-Mail, was based on a file transfer model and seemed very reliable as well

Its Internet infrastructure is far from perfect, but nevertheless Mongolia has improved its communications capability dramatically in just two years. So much so that it has attracted the attention of other developing countries facing similar problems.

GEOFF LONG



The global resources of the Internet could help fill training needs for Mongolian students of computer science.



as accommodating Mongolia's Cyrillic-based script. "It was quite an achievement that the PC-Mail system was all local development. They also had a clear awareness that they could adapt it to UUCP protocols," he says, referring to the Unix-based program that can be used for transferring files on the Internet.

This occurred in late 1994, when Datacom installed a dial-up gateway system based on UUCP protocols that allowed for the connection of its domestic system to the Internet. The system was compatible with Internet email and newsgroups, and initially these were transferred twice weekly by connecting to the Institute of Global Communications (IGC) in the US. As the system gained new users, the dial-up frequency was increased. However, Datacom's goal was to have a permanent Internet connection.

Satellite Link

The most economical and feasible connection turned out to be via satellite. A meeting with Sprint concluded in an agreement to cooperate on a 128k leased line satellite link via PanAmSat 2. Funding for the link came from a government loan and the US National Science Foundation (NSF), which agreed to pay the leasing costs if Datacom would give Mongolia's educational institutions free Internet access during 1996/7. Satellite communications equipment from Comstream was installed in late 1995, along with a Sun Netra server and Sun workstation to host Web, FTP, and Gopher servers, culminating in the opening ceremony for the country's first permanent Internet connection in January and a Mongolian web site in March of 1996.

Local Initiatives

Its Internet infrastructure is far from perfect, but nevertheless Mongolia has improved its communications capability dramatically in just two years. So much so that it has attracted the attention of other developing countries facing similar problems. However, Datacom head

GEOFF LONG



For foreign policy adviser Surgenguin Badral, the Internet will allow Mongolia's government to better deliver information throughout the country at lower cost.

Dr Enkhbat is realistic about the task ahead, likening the current situation to having only one foot on the ground. Two feet, he claims, will be when local content begins to appear from various sectors of the community. Already, though, he is thinking of how to start some sort of multimedia centre capable of developing such material.

Even with its first Internet node in place, Mongolia still has a lot of work ahead of it. As Dr Enkhbat comments, perhaps the hardest task is now to create a local infrastructure to spread the benefits of Internet to the wider community. However, the early signs are encouraging and there are a number of projects in progress aiming to build on the PAN Mongolian groundwork.

<http://www.idrc.ca/books/reports/1996/36-01e.html>

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BETTER SEWAGE TREATMENT

The Cambodian town of Battambang has two new attractions – the country's first sewage treatment plant and a beautiful new pond for wedding photos. Conveniently, they are one and the same place.

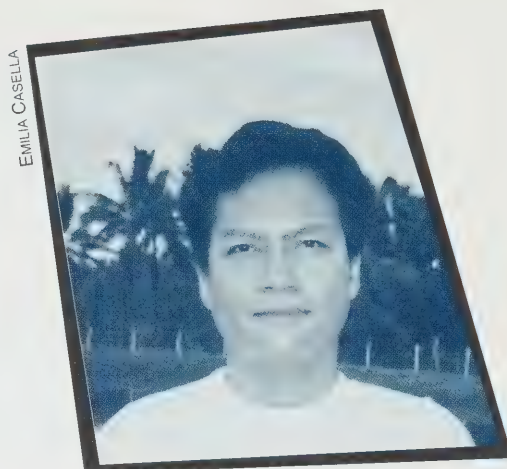
But as well as serving as a backdrop for special pictures, the new sewage treatment plant is bringing about some less popular changes in Battambang. The "polluter pays" concept is coming to the northwestern provincial town – meaning that about 12,000 home and business owners will soon have to pay to flush their toilets.

In addition, about 80 families who for the past 3 months have been using the clean, treated water from the plant to water their vegetable plots will soon have to pay for the privilege. No one knows yet how high the fees will be, but IDRC, which supports the Battambang Engineered Wetland Project and currently supplies US\$1,800 monthly to run the treatment plant, is helping the government find ways to make the operation support itself. Fees are one way. So is a fish farm on the site, a plan to dry sludge for fertilizer and the possibility of generating power using sewage-created biogas.

"Traditionally or culturally, water, like sunlight, is a free resource that people have never thought about paying for. Now people have to think about it."

"Traditionally or culturally, water, like sunlight, is a free resource that people have never thought about paying for. Now people have to think about it," says Chou Meng Tarr, a Cambodian socio-economist who, with IDRC support, has been working with the villagers in nearby Chamka Samroung, where the treated water is being used.

Before the plant opened in December 1994, most of Battambang's sewage flowed directly into the Sangke River – a source of drinking and irrigation water for many local residents. Another portion was diverted into a holding pond outside town, where local villagers used the sewage water directly on their gardens.



Sem Sundara hopes that Cambodia's first sewage treatment facility will be a model for other plants throughout the country.

The situation is similar all over Cambodia. In the capital, Phnom Penh – built at the confluence of the Mekong, Tonle Sap, and Bassac Rivers – raw sewage from one million inhabitants flows into all three waterways. In the south end of town, the Beng Trabek Lake, which doubles as the city's main sewage outlet, is the site of intensive vegetable gardening.

These vegetables are sold in local markets, contributing to outbreaks of typhoid, cholera, and other contagious diseases, according to the World Health Organization (WHO).

Sem Sundara, the project leader and a chemist with the Ministry of Environment, hopes that Battambang's sewage plant will change such situations by being a model for other new plants around the country.

Aging Sewer Network

Like Phnom Penh and other major towns, Battambang already had a network of sewage pipes, built in the 1940s during French colonial rule. However, over 21 years of war have taken their toll: entire systems are clogged. During the rainy season, many streets become wading pools of water and sewage sludge.

When the Dutch NGO Sawa began fixing Battambang's pipes, "they literally had to send down men to shovel out the stuff. They found all sorts of mines, grenades and unexploded ordinances in there," says Doug Titus, the plant's consulting biologist.

According to Sem Sundara, "In Phnom Penh, you could easily spend \$6 million to \$7 million just to repair the pipelines." After the pipes were cleaned and repaired, Sawa spent \$460,000 to



build Battambang's sewage plant, on a model called a modified, engineered wetland.

Sewage first enters detention ponds, where solids are allowed to sink to the bottom, to be later cleared out, dried, and sold as fertilizer. The dirty water is then pumped into large oxidation ponds, where a combination of algae and sunlight causes huge fluctuations in the oxygen and pH levels of the water – killing dangerous germs. After about 20 days, the water is pumped into a fish pond and a wetland pond, where for a further 9 days the water – away from human contact – loses any remaining germs.

The resulting water, although still high in nitrogen and phosphorous, meets WHO bacterial content standards for irrigation, says Tep Boonny, vice director of the provincial environment department. The nitrogen is actually a benefit to the vegetable growers of Chamka Samroung who are using the cleaned water for their gardens. Farmer Hun Sin has been using collected rainwater on half of his garden and clean water from the sewage plant on the other half. "The plants that we use the treated water on grow quicker," says Sin, who pours 200 to 400 cans of water a day on his lettuce, cucumbers, tomatoes, and herbs. Sin says if he had to pay for the treated water he would probably go back to using only rainwater from a pond on his land.

Resolving Conflict

The new water supply has caused some upheaval in the small community. "Before, the system for dividing the water was very bad," says farmer Tlok Houn. "Some people wanted the water and plugged the canal to divert the water onto their land. Then, the next person would do the same thing. People were arguing over the water," he says, adding that two neighbours – a sister and brother – actually came to blows.

"The problem is that there are people who have guns ... and the ones who have guns can access the water more easily," says Chou Meng Tarr. She has worked with the community and has now set up water users' groups to try to schedule access to the water canals that flow from the treatment plant. The water users' groups will also help people understand that the

sewage plant is owned by the community – not by the NGO that built it.

"We want to raise awareness that they are responsible for their environment and must be involved in the maintenance and use of resources," she says. However, she adds, the concept of a sewage tax or fees for water will likely face resistance.

Gregory Woodsworth, a Canadian adviser supported by IDRC in the Environment Ministry in Phnom Penh, says the fees may not be popular, but they are necessary. The project "is starting to look at costing natural resources as if they do have a value. I flush my toilet every day and I don't pay for it. You can't continue that with a large population. It's not sustainable."

IDRC is currently working with the Royal Government of Cambodia to apply the lessons learned in the Battambang case to new water and sanitation infrastructure development in other areas of the country. Major tourism development investment is going into Siem Riep town, the site of the famous Angkor Wat temples, and in the coastal resort town of Sihanoukville (formerly Kampong Som). It is hoped that private sector money from these development projects can be used to help provide appropriate and sustainable sanitation methods to these communities, based on methods developed by the Ministry of Environment, in cooperation with IDRC.

<http://www.idrc.ca/books/reports/1996/08-01e.html>

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WATER POLICY IN MANILA

Residents of the middle-class Better Living Subdivision on the southern flank of Metro Manila consider themselves lucky to have water service from the city's water utility. No matter that the water flows from their faucets for just a few hours per day, and only every other day. Up until the mid-1980s, residents had to make do with water from pump wells and delivery services. The water still had to be boiled for drinking. Residents often drove to work with car trunks full of water containers to be filled.

For people in the lower-income neighbourhoods around the subdivision, who do not have service from the Metropolitan Waterworks and Sewerage System (MWSS), pushcart vendors are still the main source of water. And they pay the vendors much more for water than their neighbours in Better Living pay for water from the faucet.

Lower income families often attempt to save time and money by buying relatively cheaper water from neighbours with connections.

Water Woes

Access to water is a growing problem in Manila, according to research fellow Dr Cristina David. She is conducting an IDRC-funded study on water distribution and household demand in the city. In terms of efficiency – which considers the proportion of water not paid for, hours of availability, and the ratio of people to connections – Metro Manila “has the worst record of all” compared to other Southeast Asian capitals. Sixty percent of the water produced by MWSS is lost to illegal connections and leakages, compared to an average of 30% among developing countries. This lost water is referred to as nonrevenue water (NRW). “Increases in water distribution, resulting from major investments by the MWSS over the past 25 years, have been almost entirely lost as NRW,” says Dr David.

In Manila, people have access to water for an average 16 hours per day, while in most capitals in the region, service is provided for the whole day. Manila has six times as many people per connection as Singapore and Kuala Lumpur, and twice as many as Bangkok. While Singapore and Kuala Lumpur are entirely cov-

ered by piped water connections, and Bangkok is 79% covered, Metro Manila has only 69% coverage. Jakarta fares even worse with 25%. Even in the better-off Asian cities, authorities are having trouble ensuring that supplies meet the increasing demand and water shortages may not be far off.

Water sold privately results in substantial revenue losses for MWSS that could otherwise be pumped into new investments and better service. Companies, and households that can afford to, sink their own tube wells, resulting in environmental damage. Groundwater extraction, which is not effectively regulated by municipal authorities, has outpaced the natural recharge rate of the aquifer and is lowering the water table. Demand in coastal areas is also causing salinization of the aquifer.

Poor Pay More

Dr David's study, begun in 1995, involved a survey of 506 households across the metropolis. It was conducted for the Philippine Institute for Development Studies (PIDS), an agency of the country's planning body. Dr David and research associate Arlene Inocencio led a team that looked at households using a variety of water services and representing various income levels. The researchers found MWSS coverage to be about 60% of households, with another 10% relying on tube wells and private waterworks and 30% on vended water.

They found that poor people, who depend mostly on vended water, pay much more for water than wealthier people and receive poorer service. Households with official MWSS connections pay the lowest price, averaging PHP5.50 (US\$0.22) per cubic metre. In contrast, water purchased indirectly from MWSS and delivered by hose costs about PHP22 per cubic metre while MWSS water delivered by container to households costs as much as PHP72 per cubic metre.

Stolen Water

Privately sold water comes from public and private faucets and even directly from water mains. It is delivered to end-users via plastic hose or is transported in containers by pushcart, bicycle or other vehicles. The study showed that much of the water actually comes from MWSS and is “stolen” through illegal connections and by meter tampering. The PIDS researchers located squatter colonies where MWSS water is systematically distributed from mainlines and government buildings. Fees





Illegal water connections are a major cause of both lost water and foregone revenue for Manila's municipal water service.

based on household size and the number of outlets are then paid to whoever dispenses the water.

"It is a puzzle why officials cannot devise a system of charging water from these areas just like the private electrical company is doing. Most cases of tampering would also be relatively easy to detect," says Dr David. Changes are beginning to be implemented to rid MWSS of graft and inefficiency. And plans to privatize much of its operations is a step in that direction.

Buying from the Neighbours

Because privately sold water can cost 13 times as much as water from direct MWSS connections, lower income families often attempt to save time and money by buying relatively cheaper water from neighbours with connections. This is inconvenient and time-consuming, although less so than other options. "Even assuming a lower opportunity cost of labour among the poorer households, the total cost of such vended water, when those factors are considered, may easily reach PHP45-55 per cubic metre or 8-10 times the cost of water from an MWSS connection," says Dr David.

As a washerwoman named Adelaida says, "I used to be able to take people's laundry home where I could keep an eye on my kids. Now I have to do it in the client's home. It is too much trouble and expense to have to lug all that water to our house."

A Boat Ride Away

In Manila's poor Tondo district, residents in one area have to take a boat ride just to get to a water source. One five-gallon container of water costs PHP1 or more and no less than PHP7 if it is delivered.

At one point, public faucets were put up by the local government and run by cooperatives

but MWSS closed them down because of mounting bills. Faced with acute water shortages, local officials are now forced to operate these faucets surreptitiously with the unofficial blessing of waterworks officials.

Dr David points out that despite plans to privatize MWSS, water tariffs still must be regulated by government because the production and distribution of water is by nature a monopoly. Also, the fact that a significant amount of water losses are due to illegal connections and meter-tampering – and hence may be relatively simple to reduce – should be considered when evaluating bids for the right to operate the MWSS water system. Preliminary results from her study indicate that price adjustments have a significant impact on demand, thus appropriate pricing would have a positive impact on household demand management. The study also indicates that households, rich and poor alike, are willing to pay much higher water prices than the MWSS water rates, if they receive better service.

Vicious Circle

For now, Manila faces a vicious circle: the municipal water service is so unreliable that people object to higher MWSS water charges. Indeed, higher water charges would not necessarily improve the efficiency of MWSS operations. Without additional revenues, however, the government lacks the funds to expand water supply, which would still be needed to satisfy projected demand – even if the amount of non-revenue water is reduced significantly. This dilemma can only be resolved by both raising MWSS water charges and implementing appropriate institutional reforms.

If the reforms under way can improve confidence in MWSS and reduce free riding, then more people would have access to water, at a lower cost to the environment in terms of groundwater depletion. In the meantime, residents of Better Living will no doubt continue to stock up on water every time the taps come on.

<http://www.idrc.ca/books/reports/11-01e.htm>

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ECOTOURISM IN THAILAND

The brilliant Green-tailed Sunbird emerged from behind the rhododendron, offering a group of excited British birders a satisfying look. This race of sunbird is endemic to Doi Inthanon National Park and a key tourist attraction for some visitors. After four days of bird watching in the area, these birders had spotted a total of 165 species, leading one veteran to describe the park as one of his “favourite places” in the whole world.

This sentiment is widely shared. In 1993, more than 900,000 people visited Doi Inthanon in northern Thailand, triple the number of a decade earlier. Most tourists come to enjoy the scenery, relax with friends, or make a pilgrimage to the summit of Doi Inthanon, which is the highest peak in the country. Others, such as these birders, come specifically to experience the stunning biodiversity in the park. Growing numbers of Thais have also taken up birding, or “du nok” as it is called in Thai.

Birding is a popular form of “ecotourism”, an activity that may ultimately help governments improve their management of natural resources. Ideally, ecotourists visit sites such as Doi Inthanon National Park to observe wildlife and spend money in the area. As a result, governments and locals have economic incentives to maintain these areas in a natural condition to ensure continued visits by ecotourists. Ecotourism is therefore promoted as a tool for biodiversity conservation and rural development.

To achieve these twin goals, however, careful management and planning is required. Before promoting ecotourism activities, park managers should assess and mitigate the potential impacts from ecotourism. We analyzed these impacts during an IDRC-funded study conducted at Doi Inthanon, in which 857 park visitors were interviewed. The study evaluated and compared the impact of ecotourists versus conventional tourists. In economic terms, we found that visitors to Doi Inthanon spent a total of CA\$12.5 million in Thailand during their stay and that ecotourists spent 33% more than other tourists, including a higher amount inside the park.

Today, 13% of the land base of Thailand is environmentally protected. However, efficient management of the protected areas is constrained by low budgets. Park entrance fees have the potential to contribute directly to management expenses, but are currently channelled into the Thai government’s general revenues. Doi Inthanon now has a two-tiered fee system, where foreigners pay a higher amount (CA\$1.25 compared to \$0.25) per person.

To increase revenues from ecotourism, some governments may be tempted to create additional parks. However, this approach could backfire if popular sites receive more funding for conservation purposes than less popular but more ecologically important sites. Another strategy is to request donations from park visitors. More than 80% of the tourists we surveyed said they would be willing to contribute to conservation efforts at Doi Inthanon – one respondent said she would have made a donation “if only she knew where to give.” However, other tourists were skeptical that their donations would be used efficiently and expressed concerns about the potential for corruption.

Ecotourism has the potential to cause harmful environmental impacts. One issue is the harassment of wildlife. For example, some birders attract birds by whistling or playing a tape-recorded song, which brings them out into the open to confront the “intruder”. When used too often, however, this strategy may cause birds undue stress. Another issue is trampling. Birders often venture off the trail in pursuit of birds, damaging the underlying vegetation and soil in the process. To reduce this problem, park managers have constructed a raised boardwalk around a heavily-used bog at the summit of Doi Inthanon.

At the Doi Inthanon Birding Center, birders are given the opportunity to share the excitement of recent sightings with each other ... a place to exchange news and gossip over a delicious Thai meal.





GLEN T. HVENEGAARD

Communities in Northern Thailand must engage in careful planning and management to draw benefits from ecotourism and avoid potential damage.

Litter is also a concern. Most of the birders we surveyed were conscientious about keeping the park clean. But Phil Round, an ornithologist and conservationist in Thailand, says that even when litter is placed in garbage bins, it may end up being thrown into the woods and burned. Similarly, air pollution can be a problem on busy weekends when up to 5,000 vehicles travel to the summit each day. Fortunately, some tourists use public transport, especially trekkers and birders.

Besides its economic and environmental impacts, ecotourism can have social effects. At Doi Inthanon, more than 4,000 people, including Thais, Karen, and Hmong, inhabit some 600 villages located in the park. Hilltribe villagers earn a living by growing rice and cash crops, such as ornamental flowers and strawberries, which are often sold in nearby cities. About 80% of villagers also collect plants and fuelwood for personal use or to sell. Villagers raise additional revenue by selling garden produce and handicrafts to tourists. If hilltribes can benefit economically from ecotourism, they may support habitat-protection initiatives and depend less on unsustainable uses of park resources.

Currently, around one-third of all tourists stop at the hilltribe villages, where their contact

with residents is mostly restricted to the souvenir trade. The exception are trekkers whose goal is to experience village life and interact with the locals. For hilltribe villages, the impacts of tourism include increased commercialization, altered food habits, and the substitution of traditional dress for Western clothing such as t-shirts. More than 60% of the trekkers we surveyed felt that their contact with village residents had negative economic and social impacts.

By contrast, the impact of ecotourism is generally more benign. At the Doi Inthanon Birding Center, birders are given the opportunity to share the excitement of recent sightings with each other. The Center, operated by a Thai birder, is a place to exchange news and gossip over a delicious Thai meal. It was here that a bird watcher from England celebrated a rare milestone – sighting his 2,500th bird species (out of some 9,000 known species around the world).

The primary goal of Thai national parks is to conserve the land in a natural state, while providing opportunities for education and recreation. Compared with other types of tourism, ecotourism has the most potential to meet these goals. It is clear from our research that ecotourists are distinct from conventional tourists and have different – and often more beneficial – environmental, social, and economic impacts on protected areas.

<http://www.idrc.ca/books/reports/1996/15-01e.html>

Glen Hvenegaard is a geography professor at Augustana University College in Camrose, Alberta and the 1993 recipient of IDRC's Young Canadian Researcher's Award. Philip Dearden is a geography professor at the University of Victoria in British Columbia.

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Smoke & Mirrors

The Canadian Tobacco War

by Rob Cunningham



IDRC 1996, PAPERBACK (6 3/4 X 9 3/4 INCHES),
380 PAGES, ISBN 0-88936-755-8, CA \$25.00

Smoke & Mirrors provides an insider's view of the Canadian tobacco war, a century-old conflict that began to escalate in the 1980s. It explains how Canada emerged as a global leader in the public health crusade to regulate the powerful tobacco industry and describes in fascinating detail the bitter campaigns to maintain high tobacco taxes, ban tobacco advertising, eliminate tobacco sponsorships, require plain packaging, mandate clear health warnings, and prohibit smoking in public places and workplaces.

While tobacco wars continue to rage in Canada and the industrialized world, the battleground is shifting increasingly to Eastern Europe and the countries of the developing world. For those in the front lines and other concerned readers, *Smoke & Mirrors* outlines how to take on the "merchants of death" — and win.

The Author

A lawyer by profession, Rob Cunningham holds degrees in political science, law, and business. Cunningham first became active in tobacco issues in 1988 and has since become a recognized expert in the field of tobacco control. He has worked as a consultant for provincial, national, and international health organizations. As one of the core group of Canadian activists fighting for tobacco control, Cunningham has testified before parliamentary committees, given hundreds of media interviews in Canada and the United States, published numerous tobacco-related articles, and initiated private prosecutions for violations of tobacco control laws. Cunningham now works in Ottawa as a senior policy analyst for the Canadian Cancer Society.

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226 PP., ISBN 0-88936-801-5, CA \$45.00

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by the International Council for Local Environmental Initiatives

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The Health Gap Beyond Pregnancy and Reproduction

by Jennifer Kitts and Janet Hatcher Roberts

Health research, when it does address women's concerns, tends to emphasize and cater to their needs in reproductive health. *The Health Gap* identifies and addresses key gaps in gender and health research: women and AIDS, tropical disease, the working environment, and barriers to quality health care. It also identifies new and emerging themes in women's health and sets priorities for future action.

The Authors

Jennifer Kitts is currently completing a Master of Laws degree in the prestigious international and comparative law program at the University of Brussels. As a past consultant to IDRC, the World Health Organization, and other institutions, her expertise is in the health, legal, ethical, and socioeconomic issues affecting the lives of women.

Janet Hatcher Roberts is a health-policy specialist in the Program Branch of IDRC. Formerly the Deputy Director of Research and Evaluation at the Canadian Royal Commission on New Reproductive Technologies, her main interests involve creating and ensuring links between research and strategic policy development.

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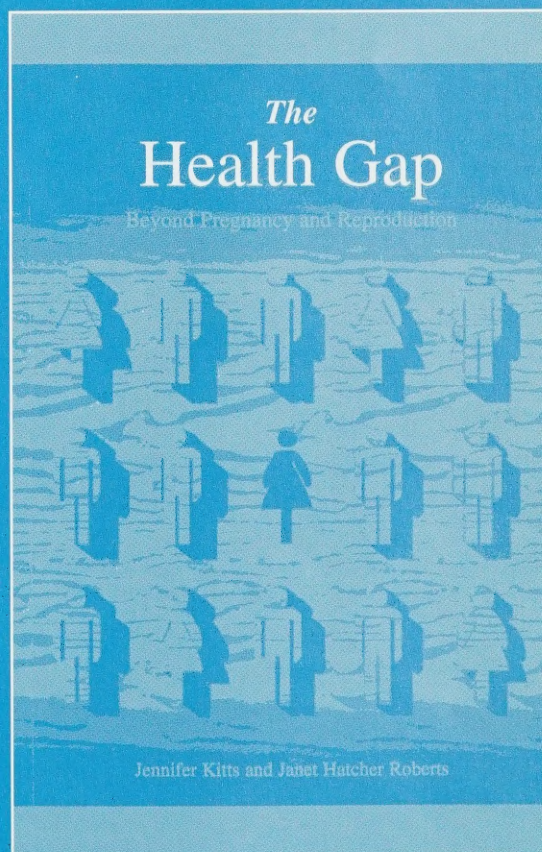
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Beyond Intellectual Property

Toward Traditional Resource Rights for Indigenous Peoples and Local Communities

by Darrell A. Posey and Graham Dutfield

In today's global marketplace, no stone goes unturned. Where there is commercial value, there are profits to be made. However, as entrepreneurs scour the world in search of new commodities, a voice of dissent is growing and striving to be heard. That voice belongs to the world's indigenous peoples, and it is voice that has been ignored long enough.

Beyond Intellectual Property listens and respond to this voice. It offers sound and reasonable advice on how indigenous peoples and local communities worldwide should approach and deal with the myriad issues surrounding intellectual property and traditional resource rights.

For indigenous peoples' groups, activists and policymakers in intellectual property, and all those concerned with the preservation of our planet's biological and cultural diversity, *Beyond Intellectual Property* provides an invaluable and eye-opening look into one of the most provocative and explosive issues of this century and likely the next: the patenting of life.

The Author

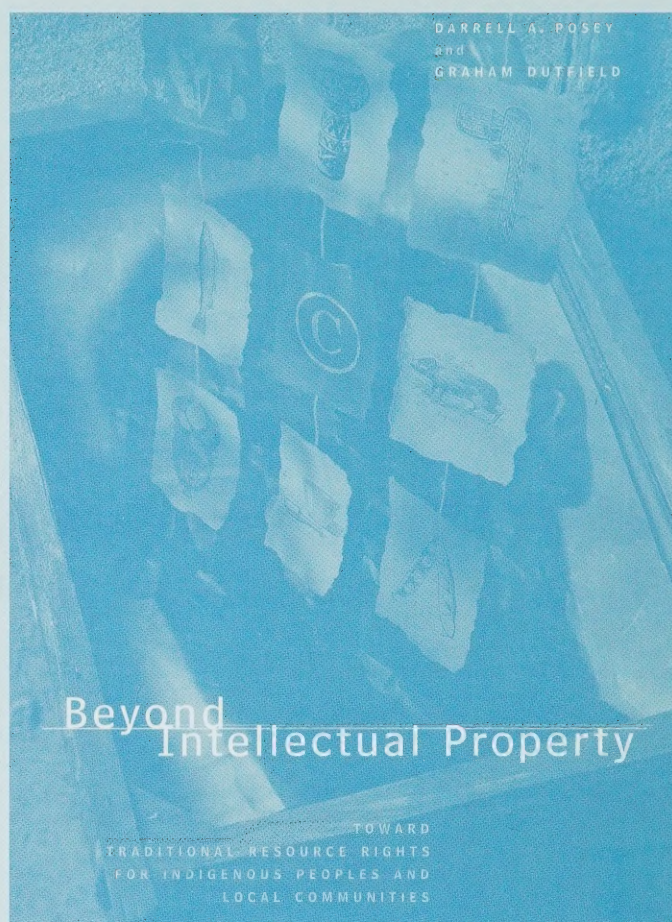
Darrell A. Posey is Director of the Programme for Traditional Resource Rights of the Oxford Centre for the Environment, Ethics, and Society and President of the Global Coalition

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250 PP., ISBN 0-88936-799-X, CA \$30.00

for Bio-Cultural Diversity, under whose auspices he founded and coordinates the Working Group on Traditional Resource Rights.

Graham Dutfield is Research Coordinator for the Working Group on Traditional Resource Rights. He holds degrees in Latin American studies, from Portsmouth University, and environment and development, from Cambridge University.

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A New Method for Preventing Malaria Deaths

edited by Christian Lengeler, Jacqueline Cattani, and Don de Savigny

For the first time since the 1950s, there is hope that malaria can be controlled in areas where it is highly endemic, especially in Africa. Large-scale trials of insecticide-treated nets in The Gambia, Ghana, and Kenya have produced remarkable results. The mortality rate of children under 5 years of age has been reduced by up to 63 percent.

Jointly published by the World Health Organization and Canada's International Development Research Centre, *Net Gain* describes this important new weapon in the fight against malaria. It reviews and discusses the development of the treated mosquito net, focusing on the technology, its implementation, and its promotion. Health researchers, students, and scholars, as well as program managers, decision-makers, and donors, will find *Net Gain* a revealing examination of an exciting new technology.

The Editors

Christian Lengeler is Senior Scientist in the Department of Public Health and Epidemiology of the Swiss Tropical Institute in Basel, Switzerland.

Jacqueline Cattani is Manager of the Task Force on Insecticide-Impregnated Bednets and Other Materials with the UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases in Geneva, Switzerland.

Don de Savigny is Principal Health Specialist in the Programs Branch of IDRC, where he manages health technology and intervention research.



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